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June 30, 2012

VIA U.S. MAIL & E-MAIL

Hugh Barroll, Assistant Regional Counsel
U.S. Environmental Protection Agency
75 Hawthorne Street
San Francisco, CA 94105
Attn: Lawrence Torres (WTR-7)

RE: Issuance of Findings of Violation and Order for Compliance for Waimanalo Gulch Sanitary Landfill – CWA-309(a)-12-003
Detention Basin Evaluation – Plan of Study

Dear Hugh:

Thank you for sending EPA's comments on the above-referenced Detention Basin Plan of Study (the "POS"). We appreciate the comments and are pleased that EPA agrees, in general, with the proposed scope of work. I have copied each of your comments below and provide Waste Management of Hawaii, Inc.'s responses.

EPA Comment 1. *The Plan of Study describes the North and South Basin Areas but does not provide a volume for each. While not necessary for the Plan of Study, the volume of each basin area should be included when describing the detention basin.*

WMH Response: WMH has updated the POS to include the estimated volume of each of the two areas within the detention (sometimes called "sedimentation") basin. For your reference, the volume of the North Basin is approximately 1.3 acre-feet (424,000 gallons), and the estimated volume of the South Basin is approximately 1.7 acre-feet (554,000 gallons). These estimates are based on the volume of each basin up to the height of the interior berm separating the two basins. The estimated volume of the entire detention basin is approximately 9.5 acre-feet (3.1 million gallons). This volume is greater than the sum of the North and South Basins because the interior berm separating the two basins is significantly lower than the spillway outlet from the entire detention basin.

EPA Comment 2. *The Plan of Study states that the model will be based on data from the Palehua rain gage, NOAA data, and on-site rainfall records. Will these data sets be merged or will there be separate model runs for each data set?*

WMH Response: WMH's consultant has revised the POS to state that the study will rely primarily on on-site rainfall records, but will be supplemented by data from NOAA Atlas 14, Volume 4 (Precipitation-Frequency Atlas for the Hawaiian Islands) as necessary to address events which were not observed and events with a specific frequency. With the completion of the Western Diversion System, rainfall recorded uphill at the Palehua station will not be representative of the rainfall that falls on the landfill and flows to the detention basin as stormwater. Rather, WMH believes that the rainfall data at the site is the best data available for modeling and evaluating the detention basin; however, additional supplemental data may be necessary where there is not sufficient on-site date for modeling purposes.

EPA Comment 3. *GEI states that it will run the HEC-HMS model under the assumption that the detention basin is empty prior to each storm. What is the basis for this assumption as GEI also notes that the sediment forebay provides a retention function and "often contains a small pool of water?"*

WMH Response: The evaluation of the detention basin necessarily will require certain assumptions. The basis for WMH's use of this assumption is that the evaluation model should be run based on some known baseline (e.g., basin empty), which can then be evaluated for sensitivity to other scenarios. In light of EPA's comment, however, GEI has amended the POS to evaluate several scenarios – namely (1) basin empty, and (2) forebay (i.e. North Basin) full. Based on these modeling runs, it should be possible to evaluate the sensitivity of the basin's effectiveness to residual quantities of stormwater in the North Basin.

EPA Comment 4. *Several portions of the Plan of Study appear to rely on "historic data" to determine the pollutant loads into the basin. However, EPA is not aware of any such historic data that characterizes pollutant loading into the basin. Samples have been collected from the detention basin outlet and from areas above the landfill (up-canyon), but not from the basin inlet. Further, due to completion of the Western Diversion System and affiliated stilling basin, run-off from above the landfill no longer enters ·the detention basin. Therefore, it is not valid to assume that up-canyon water quality characteristics are indicative of the quality of water entering the detention basin. To address this issue, the Plan of Study should include a water quality sampling element that addresses inflow to the detention basin. This sampling effort should address the constituents WM is required to analyze under its NPDES permit, and should specifically assess what portion of these loadings are in the dissolved and suspended fractions of the influent to the detention basin. This sampling need not address flows from up-canyon areas that are now being diverted from the detention basin.*

WMH Response: As I mentioned to you on the telephone, WMH does not have water quality analysis for flows into the detention basin, and even if we had data from prior years, those concentrations may not be representative of conditions that now exist after the completion of the Western Diversion System. While WMH recognizes the utility of obtaining actual data of stormwater quality entering the detention basin, the collection of a suitable number of representative samples may cause a significant delay in completing the POS. The months of April through September are the driest months of the year on Oahu and, therefore, it is likely that the landfill will not have enough rainfall to generate stormwater to collect a sufficient amount or a suitable number of representative stormwater samples. Furthermore, there are four inlets to the sedimentation basin. These four inlets are discharge points from different areas around the landfill facility. Depending on any particular rainfall event, each inlet point may or may not have a discharge, may start discharging at different times, will have significantly different volumes of water discharged, and may have significantly different water quality characteristics.

Given this variability, it may be difficult to determine whether any one or more samples constitute representative samples.

While WMH is not opposed to collecting water quality data for discharges to the detention basin, WMH is concerned that the lack of rainfall and the variability among the inlet discharges will delay the collection of sufficient representative samples, which will in turn delay the completion of the POS. WMH therefore proposes that it attempt to collect water quality data for the detention basin over the next six-month period – i.e., until the end of December. WMH will provide the data to EPA either at the end of the six-month period or earlier if WMH is able to collect a sufficient number of representative water quality samples. Upon approval of the water quality sampling data for use in the evaluation, WMH will proceed with completing the evaluation. If WMH is not able to collect a sufficient water quality data during this period, WMH and EPA will discuss an alternative approach for completing the basin evaluation.

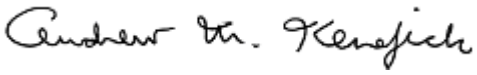
EPA Comment 5. *While not necessary before the Plan of Study is approved, EPA would like to know which "available published presumptive water quality benefits for similar detention systems," Waste Management will be using.*

WMH Response: As part of implementing the POS, GEI will research and identify available published studies to identify suitable comparisons. An example of one such resource is the Urban Drainage and Flood Control District, *Urban Storm Drainage Criteria Manual – Volume 3, Best Management Practices* (Nov. 2010). Other appropriate references will be included with the study.

* * *

Again, thank you for EPA's comments. With the exception of Comment #4, WMH believes that it has addressed all of EPA's comments. As discussed for Comment #4, the parties will need to discuss how to best address the problem of collecting sufficient water quality data to proceed with the evaluation and not unduly delaying its completion. Please call me to discuss how to proceed. Thanks.

Sincerely,



Andrew M. Kenefick

Attachment
cc: *via e-mail only*
David Wampler – EPA Region 9
Dana Viola – City & County of Honolulu
Joseph Whelan - WMH
LL to H Barroll re Basin Evaluation Plan (6/30/12)

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GEI Consultants

Geotechnical
Environmental
Water Resources
Ecological

June 29, 2012
Project Number 070181

Waste Management
Mr. Richard T. Von Pein, P.E.
Manager, Special Projects, Western Group
6640 Amber Lane
Pleasanton, CA 94566

Subject: Proposed Plan of Study for Detention Basin Evaluation
Waimanalo Gulch Sanitary Landfill

Dear Mr. Von Pein:

As requested, GEI Consultants ("GEI") has prepared the enclosed revised proposed Plan of Study ("POS") to evaluate the operational capability of the detention basin that serves the Waimanalo Gulch Sanitary Landfill ("WGSL"). This POS is prepared at the request of Waste Management of Hawaii, Inc. ("WMH") – on its behalf and on behalf of the City and County of Honolulu ("CCH") – to comply with EPA Order No. CWA-309(a)-12-003, dated Nov. 29, 2011 ("Order"). This letter describes GEI's project understanding, scope of services, and schedule to perform the Study. GEI will submit separately its budget for performing this POS. This POS is a revision of our earlier POS dated February 27, 2012. It has been revised to address comments from the U.S. Environmental Protection Agency.

General Background

The subject detention basin was originally designed and constructed in the late 1980's by the CCH. Several subsequent modifications have been made to the basin (including most recently in 2006-2007). The modifications included adding a small berm to separate the bottom of the basin into two areas and adding an under drain system. The original drainage system, detention basin, and subsequent modifications were designed to detain stormwater in order to allow some sediment to settle out of the water prior to discharge as part of the management of stormwater at WGSL. All stormwater runoff resulting from precipitation onto the landfill footprint, which is diverted away from the active cells, is diverted to the detention basin prior to discharge. Runoff primarily from disturbed areas of the WGSL property and minor amounts of run-on are also directed to the detention pond. Offsite run-on is collected by the Western and Northern diversion systems, which control stormwater run-on from areas upgradient of the landfill.

The Western and Northern diversion systems collect offsite stormwater from the upgradient drainage areas, and then convey the stormwater around the landfill, ultimately discharging the

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offsite stormwater into the "stilling basin" located immediately downstream of the existing detention basin. This offsite run-on stormwater does not contribute to landfill stormwater run-off that flows to the detention basin. The current east side drainage system includes dual 36-inch HDPE pipes that run across the ash monofill and a 42-inch reinforced concrete pipe located at the toe of the landfill that convey water from the east side to the detention basin.

Detention Basin Features and Role in Stormwater Control

The detention basin was constructed in the late 1980's. The upper portion of the basin sideslopes consist of earthen embankments. The lower portion of these sideslopes and basin floor were formed by excavating into native materials. The existing detention basin facility consists of several components, which are described as follows:

- Interior Embankment and North Basin – A 4-foot high riprap-faced interior berm divides the northern (upstream) portion of the detention basin from the southern portion. The north basin functions as a pre-settling pool to enable coarser sediment to settle out of the inflow, reducing the total volume of sediment carried into the south basin. It also helps dissipate energy and associated turbulence entering the detention basin in order reduce re-suspension of finer material that may have previously settled out in the south basin. The approximate elevation of the north basin floor is El. 65 [The basin side slopes adjacent to the floor are inclined at 2-to-1 slopes (2H:1V) and the total depth of the north basin is approximately 18 feet measured from the top of the side embankments. The north basin provides a retention function and often contains a small pool of water that naturally drains by infiltration and evaporation.

  A riprap lined energy dissipater located at the northeast corner of the north basin reduces the velocity of discharges from the 24-inch and 42-inch stormwater pipes entering the basin at this location. These pipes convey surface water run-off from the lower access road and southeast portions of the landfill to the detention basin.

- South Basin Area – The south basin portion of the detention basin is also approximately 18 feet deep and has 2:1 side slopes. The south embankment of the detention basin is approximately 4.5 feet lower than the other sides of the basin and serves as a broad-crested weir emergency spillway. The south basin provides a detention function and is drained via two vertical drop inlet type riser pipes, which serve as the primary outlets from the detention basin, and a horizontal sub-drain system that underlies the entire basin floor. The sub-drain system consists of series of interconnected 18-inch wide by 24-inch deep infiltration trenches, lined with a filter fabric and filled with ½ to ¾ - inch drainage rock. A 6-inch layer of filter sand covers the trench envelopes and is exposed to the basin floor. The trenches are drained by 6-inch diameter perforated high-density polyethylene ("HDPE") pipes that are connected by manifolds and discharge from the detention basin via the two primary outlet riser pipes. This sub-drain system also serves as a gravity sand filter to provide a degree of water quality treatment.

- Outlet Riser Pipes – Two 48-inch diameter vertical reinforced concrete riser pipes located in the south basin function as the primary outlets from the detention basin.

The top of the riser pipes is 12.5 feet above the detention basin floor, and 1 foot below the top of the weir spillway located at the downstream side of the detention basin. The riser pipes do not have intermediate openings. Consequently, drainage of the detention basin occurs through the top of the two trash rack covered riser overflow pipes and secondarily through the underlying sub-drain system. The vertical riser pipes connect via a concrete transition box to two 42-inch diameter horizontal corrugated metal pipes ("CMPs") located at the base of the south embankment and discharge onto the rock faced spillway apron at the downstream toe of the south embankment.

- South Embankment and Spillway –The crest of this embankment is lower than the side embankments and serves as a broad-crested weir spillway. The spillway and downstream apron are faced with a 2-foot thick layer of grouted riprap. The embankment has 2:1 side slopes, a crest width of approximately 19 feet and a weir length of approximately 150-feet. The interior embankment height is approximately 14-feet and the exterior embankment height is approximately 18-feet, as measured at the downstream toe of the embankment.

The volume of the North Basin is approximately 1.3 acre-feet (424,000 gallons), and the estimated volume of the South Basin is approximately 1.7 acre-feet (554,000 gallons). These estimates are based on the volume of each basin up to the height of the interior berm separating the two basins. The estimated volume of the entire detention basin is approximately 9.5 acre-feet (3.1 million gallons). This volume is greater than the sum of the North and South Basins because the interior berm separating the two basins is significantly lower than the spillway outlet from the entire detention basin.

Scope of Work

The POS addresses the bulleted items in the Order under Paragraph 8 and the items described in narrative form in Paragraph 10, as modified by agreement with EPA, to evaluate the detention basin's capacity to detain stormwater under current WGSL conditions, which includes the functional completion of the Western Diversion Project. Specifically, the Order requires the following elements:

- Modeling of the inflows the detention basin could be expected to receive under a variety of storm conditions including, but not limited to the 10-year/24-hour storm, the 25-year/24-hour storm, and the 100-year/24-hour storm.
- Modeling of the capacity of the detention basin to capture and retain flows from the storms analyzed in the inflow modeling element.
- Discharge projections for the detention basin under each of the storms analyzed in the inflow modeling element. These discharge projections shall assess the anticipated volume and duration of discharges anticipated under each of the analyzed storms, whether discharges from the detention basin spillway will occur, and whether anticipated discharges will comply with the requirements of the existing WGSL NPDES

permit including both numeric and non-numeric criteria.

- A discussion of the plans for improvements to the Eastern Drainage System, including a schedule for completing this project (Phase I and Phase II) and analysis of the impact of completion of planned improvements to the Eastern Drainage System on the modeling and discharge projections required above.
- A schedule for completing the work called for by the plan of study and the evaluation report.

Accordingly, the Scope of Work for the POS will include the following:

- A review will be performed to document recorded stormwater quality/ quantity measurements for experienced rainfall events in order to characterize the performance of the detention basin. This will identify how the water quality characteristics change as the water passes through the basin. Construction documents and as-constructed conditions will be reviewed, and used together with observations made during the site visit to create an up-to-date hydrologic model.
- A site visit, attended by representatives of GEI and WMH, will be performed for reconnaissance of the landfill and its drainage features, confirm the current characteristics and configuration of the detention basin and its ancillary facilities, observe the site hydrologic characteristics, confirm the detention basin's ability to capture/detain flows, and to obtain general overall site familiarity.
- Supplemental surveying measurements of the detention basin, and other key drainage features that collect and transport stormwater run-off to the detention basin, will be obtained to verify key as-constructed elevations, areas, and volumes of select drainage features.
- Water quality sample analysis results from rainfall/runoff events will be obtained from WMH, representing samples at the detention basin inlet and from upstream of disturbed areas of the landfill. The data will be reviewed to identify the water quality constituents present in water conveyed to the detention basin, including iron, zinc and total suspended solids (TSS). Given the recent completion of the Western Bypass, WMH does not have water quality data that represents stormwater quality based on conditions that now exist after completion of the Bypass. WMH will attempt to collect water quality data for the detention basin over the next six month period – i.e., until the end of December, 2012. GEI and WMH will provide the data to EPA either at the end of the six-month period or earlier if a sufficient number of representative water quality samples have been collected. Upon approval of the water quality sampling data for use in the evaluation, GEI will proceed with completing the evaluation. If WMH is not able to collect a sufficient water quality data during this period, WMH, GEI, and EPA will discuss an alternative approach for completing the basin evaluation.
- GEI will also review and summarize water quality data from other stormwater discharge sources, if available, near the site. This water quality data will be reviewed by GEI from available published information from the U.S. Geological Survey or other agencies.

- Site-specific hydrologic run-off coefficients will be developed based on current conditions. The hydrologic site modeling will be accomplished using computer model HEC-HMS. The SCS unit graph and curve number algorithm will be used within that model to convert rainfall to runoff. This will produce a runoff hydrograph that has all the characteristics needed for the runoff quantity evaluations that will be performed: peak flow rate, hydrograph shape and volume of runoff. The runoff quantity will also be correlated with available published presumptive water quality benefits for similar detention systems.

- The hydrology of the detention basin stormwater inflows and routed outflows will be modeled using HEC-HMS computational methods for the following storm events:
    - a rainfall event of 0.1 inch or greater that occurs at least 72 hours after the previous measurable (greater than 0.1 inch) rainfall event (this is the "representative storm" consistent with the NPDES permit);
    - a 1-inch rainfall consistent with the CCH storm drainage standards for "Detention Based Water Quality Control;"
    - the 10-year/ 24-hour rainstorm;
    - the 25-year/ 24-hour rainstorm; and
    - the 100-year/ 24-hour rainstorm.
- Data for the modeled storm events will be based primarily on site rainfall records collected by Waste Management, supplemented by data from NOAA Atlas 14, Volume 4 (Precipitation-Frequency Atlas for the Hawaiian Islands) as necessary to address events which were not observed and events with a specific frequency. Each modeled storm event will evaluate several scenarios, including the north basin being both full and empty at the beginning of an event as part of a sensitivity evaluation.
- Key information that will be generated includes the peak rates of flow, inflow and outflow hydrographs (describing volume and duration) and related hydrologic characteristics for each of the subject rainstorms. The routed water surface elevation in the detention basin will be specifically identified and the quantity and duration of water detained noted, if any, as it passes through each of the detention basin outlets or spillway components for each of the subject rainstorms. The relationship between the computed hydrology and the hydrologic standards that must be met for the permitted detention basin will be discussed.
- GEI will estimate the amount of total suspended solids that will be carried into the detention basin under each of the studied storm conditions.
- GEI will use the hydrology study results and the historical water quality sampling data to estimate water quality characteristics of the stormwater run-off collected in the detention basin in each storm condition studied.
- GEI will perform the following steps to evaluate how the detention basin potentially affects the quality of water entering and leaving the basin.
    - GEI will review available historic water quality data from on-site and off-site

sources including TSS, zinc and iron parameters. The on-site water quality data will be used to estimate the influent and effluent stormwater parameters into the detention basin. The influent and effluent data will be compared to determine the impact that the detention basin has on the water quality entering and leaving the basin. The rainfall associated with the sampling event, if available, will be used to estimate the flow volume into the basin associated with a given influent sampling event.

- The detention time and settling capacity of the existing basin will be determined by estimating flow velocities in the basin during the various storm events stated above. Based on these flow velocities, the minimum particle size settling in the basin during a particular storm event will be estimated.
- Historical water quality data from off-site sources will be used to estimate background levels of total suspended solids, iron and zinc in the area of the site. This data will be used to determine how the reported influent and effluent stormwater from the detention basin compares to background levels.

- The evaluation for all the rainfall events noted in the Order and described herein will be based on a single scenario defined by the current conditions at the site.

GEI will prepare a report describing these investigations and the results of this study. The report will specifically address the capacity of the detention basin to receive and discharge stormwater run-off for each of the modeled storm events and whether the modeled stormwater discharges from the detention basin will meet applicable NPDES permit requirements.

The extent to which permitted stormwater discharge standards cannot be met, including NPDES requirements, will be identified based on the study information.

<u>Preliminary Schedule</u>

- GEI anticipates that study will begin within two weeks of EPA approval of the POS. Field work, including specifically precipitation event monitoring and documentation, is estimated to require 150 calendar days. Precipitation and water quality data gathered by WMH will be provided to EPA either at the end of this period or earlier if WMH is able to collect a sufficient number of water quality samples sooner. Upon approval of the data, WMH will have GEI proceed with the remaining documentation and evaluation.

- A draft report will be submitted to WMH and CCH for review within 45 days thereafter. After WMH and CCH have completed their reviews (estimated at 15 days), a final report will be submitted to WMH and CCH within 30 days thereafter. The final report will be submitted by WMH and CCH to USEPA.

We appreciate the opportunity to provide our services for this important project. If you have any questions, please do not hesitate to contact us.

Sincerely,

GEI CONSULTANTS, INC.

Leonard J. Sansone, P.E.
Project Engineer

William A. Rettberg, P.E.
Vice President

LS/WR/sgb